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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/926,713	03/05/2002	Yasuji Hiramatsu	216723US2PCT	3517

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EXAMINER

PAIK, SANG YEOP

ART UNIT PAPER NUMBER

3742

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/926,713

Applicant(s)

HIRAMATSU, YASUJI

Examiner

Sang Y Paik

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-5, 8-14 and 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Holmes (US 4,217,570).

Holmes anticipates the structure claimed including a ceramic substrate made of silicon nitride with a thickness of 10 mm or less, an insulating layer made of silicon oxide which is disclosed by the applicant to have the resistive volume higher than the silicon nitride where the volume resistance of the insulating layer is not less than 10 times larger than the volume resistivity of the silicon nitride ceramic substrate, a resistance heating element formed on the insulating layer and the thickness of the insulating layer being at minimum average of .1 um, the resistance heating element further having at least one of the claimed noble metal such as nickel

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and a conductive ceramic such as oxides of aluminum, silicon, tantalum, titanium, and zirconium.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 5, 8, 12-16, 18 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii (US 5,851,298) in view of Nobori et al (US 5,616,024) or Kawanabe et al (US 6,133,557).

Ishii shows a ceramic heater having a ceramic substrate made of nitride and the insulating layer made of oxide ceramic such as alumina having the volume resistivity not less than 10 times higher than that of the ceramic substrate and a resistance heating element formed in the insulating layer. However, Ishii does not disclose that the heating element is formed on the insulating layer.

Nobori et al shows a ceramic heater having a heating element formed on a ceramic layer which is then molded with another ceramic layer substrate. Kawanabe et al also shows a ceramic heater having a heating element formed on a ceramic layer which is laminated with another ceramic layer to form a ceramic heater. In view of Nobori et al or Kawanabe et al, it would have been obvious to one of ordinary skill in the art to provide a resistance heating element on an insulating layer as an alternative heating arrangement to securely place a heating element on a ceramic heater.

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Kawanabe et al shows the resistance heating element made of tungsten, molybdenum and aluminum nitride and that the diameter of the ceramic heater is 8 inches which is equivalent to about 203 mm (see column 13, lines 31-55). It would have been obvious to one of ordinary skill in the art to adapt Ishii with the diameter with the claimed range to accommodate the wafer that is being heating on the surface of the ceramic heater and, although, it is not shown that the diameter of the ceramic substrate can be more than 300 mm, it would have been further obvious to one of ordinary skill in the art to adapt the ceramic substrate having the diameter more than 300 mm to accommodate various sizes of wafer that would have heated by the ceramic substrate.

Nobori et al further shows that the heating element made of tungsten or molybdenum having a plurality of circuits and a bottomed hole to provide a temperature-measuring element therein. In view of Nobori et al, it would have been obvious to one of ordinary skill in the art to adapt Ishii with a plurality of circuits to have a plural heating element that can be independently controlled to provide the desired heating across the heating surface and further adapt with a temperature sensor to measure the heating temperature to maintain the desired heating.

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii in view of Nobori et al or Kawanabe et al as applied to claims 1-3, 5, 8, 12-16, 18 and 20-22 above, and further in view of Fukazawa et al (US 4,449,039).

Ishii in view of Nobori et al or Kawanabe et al discloses all the structure claimed except the heating element is comprised of metal oxides.

Fukazawa et al shows a ceramic heater with a resistance heating element made of a metal oxide such as alumina. In view of Fukazawa et al, it would have been obvious to one of ordinary skill in the art to adapt Ishii, as modified by Nobori et al or Kawanabe et al, with the heating

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element having a metal oxide to improve the oxidation and thermal resistance in high operating temperatures.

6. Claims 6, 7, 24 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al (US 6,080,970) or Kawanabe et al (US 6,133,557) in view of Yusio et al (US 6,423,400).

Kawanabe et al or Yoshida et al shows a ceramic heater having a ceramic substrate with a resistance heating element formed on a surface of the ceramic substrate (see column 7, lines 23-35; and, column 5, lines 52-64, respectively). However, the claimed warped ceramic substrate is not shown.

Yusio et al shows a wafer supporting ceramic substrate susceptor having a warped ceramic substrate in one direction. Yusio et al also shows that the warped amount can be in the range of 10 microns or more (see column 16, line 12). In view of Yusio et al, it would have been obvious to one of ordinary skill in the art to adapt Kawanabe et al or Yoshida et al with the warped substrate having the claimed range to provide a close thermal contact between the wafer and the wafer heating/supporting ceramic heater so that a high thermal conductivity can be made.

Kawanabe et al shows the resistance heating element made of tungsten, molybdenum and aluminum nitride. Kawanabe et al further shows that the ceramic heater is made of laminating green sheets having the thickness of about .5 mm and that one of the ceramic substrate is shown to have the thickness of 10 mm and the diameter of 8 inches which is equivalent to about 203 mm (see column 13, lines 31-55). Although, it is not shown that the diameter of the ceramic substrate can be more than 300 mm, it would have been obvious to one of ordinary skill in the art

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to adapt the ceramic substrate having the diameter more than 300 mm to accommodate various sizes of wafer that would have heated by the ceramic substrate.

Yoshida et al further shows the resistance heating element made of tungsten, molybdenum, and carbides or nitrides of metals.

7. Claims 23 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al or Kawanabe et al in view of Yusio et al as applied to claims 6, 7, 24 and 26-29 above, and further in view of Nobori et al (US 5,616,024).

Yoshida et al or Kawanabe et al in view of Yusio et al discloses all the structure claimed except the heating element having a plurality of circuits.

Nobori et al shows a ceramic heater having a heating element having a plurality of circuits, and Nobori et al further shows a bottomed hole to provide a temperature-measuring element therein. In view of Nobori et al, it would have been obvious to one of ordinary skill in the art to adapt Yoshida et al or Kawanabe et al, as modified by Yusio et al, with a plurality of circuits to have a plural heating element that can be independently controlled to provide the desired heating across the heating surface and further adapt with a temperature sensor to measure the heating temperature to maintain the desired heating.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al or Kawanabe et al in view of Yusio et al as applied to claims 6, 7, 24 and 26-29 above, and further in view of Fukazawa et al (US 4,449,039).

Yoshida et al or Kawanabe et al in view of Yusio et al discloses all the structure claimed except the heating element is comprised of metal oxides.

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Fukazawa et al shows a ceramic heater with a resistance heating element made of a metal oxide such as alumina. In view of Fukzawa et al, it would have been obvious to one of ordinary skill in the art to adapt Yoshida et al or Kawanabe et al, as modified by Yusio et al, with the heating element having a metal oxide to improve the oxidation and thermal resistance in high operating temperatures.

Response to Arguments

9. Applicant's arguments with respect to claims 1-30 have been considered but are moot in view of the new ground(s) of rejection.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Y Paik whose telephone number is 703-308-1147. The examiner can normally be reached on M-F (8:00-5:30) First Friday Off.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0861.

S. Paik

Sang Y Paik
Primary Examiner
Art Unit 3742

syp